

Amendment and Response Under 37 C.F.R. §1.116 - Expedited Examining Procedure

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Serial No.: 09/519,448

Confirmation No.: 6966

Filed: 5 March 2000

For: FLUID HANDLING DEVICES WITH DIAMOND-LIKE FILMS

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. **(Previously Presented)** A fluid handling device comprising a substrate and an optically transmissive diamond-like film disposed on at least a portion of the substrate, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen.
2. **(Original)** The fluid handling device of claim 1 comprising a capillary having an internal surface and an external surface, wherein at least a portion of at least one of the internal or external surfaces includes an optically transmissive diamond-like film disposed thereon.
3. **(Original)** The fluid handling device of claim 2 wherein the external surface of the capillary includes an optically transmissive diamond-like film disposed on at least a portion thereof.
4. **(Original)** The fluid handling device of claim 1 comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface, wherein at least a portion of the fluid handling surface includes an optically transmissive diamond-like film disposed thereon.
5. **(Original)** The fluid handling device of claim 4 wherein the optically transmissive diamond-like film is also hydrophilic.

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6. **(Original)** The fluid handling device of claim 4 comprising:
a first non-elastic, polymeric substrate comprising a first major surface that includes the microfluidic handling architecture and a second major surface; and
a second polymeric substrate that is integrally bonded to said second major surface of said first substrate, wherein the second substrate is capable of forming a free-standing substrate in the absence of said first substrate.
7. **(Original)** The fluid handling device of claim 4 comprising a cover layer on the microfluidic handling architecture.
8. **(Original)** The fluid handling device of claim 7 wherein the cover layer is bonded to the first major surface of the first substrate.
9. **(Original)** The fluid handling device of claim 4 wherein the microfluidic handling architecture comprises structures selected from the group consisting of microchannels, fluid reservoirs, sample handling regions, and combinations thereof.
10. **(Original)** The fluid handling device of claim 9 wherein at least one of the structures comprises a fluid handling surface, at least a portion of which has the optically transmissive diamond-like film disposed thereon.
11. **(Original)** The fluid handling device of claim 4 comprising a first polymeric substrate comprising a first major surface that includes a plurality of microfluidic handling architectures and a second major surface, wherein the article is in the form of a roll.
12. **(Canceled)**

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13. **(Original)** The fluid handling device of claim 1 wherein the optically transmissive diamond-like film has disposed thereon linking agents and a reactant affixed to the linking agents to form a binding site.
14. **(Original)** The fluid handling device of claim 13 wherein the linking agents are covalently attached to the diamond-like film.
15. **(Original)** The fluid handling device of claim 13 wherein the reactant is selected from the group consisting of nucleic acids, proteins, and carbohydrates.
16. **(Canceled)**
17. **(Original)** The fluid handling device of claim 1 wherein the diamond-like film is also hydrophilic.
18. **(Previously Presented)** A fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen.
19. **(Previously Presented)** A fluid handling device comprising a substrate and an optically transmissive and hydrophilic film disposed on at least a portion of the substrate, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least

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about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film has an extinction coefficient of no greater than 0.010 at 250 nm.

20. **(Currently Amended)** A fluid handling device comprising a substrate and a diamond-like glass film comprising a dense random covalent system comprising at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, on a hydrogen-free basis, disposed on at least a portion of the substrate.
21. **(Original)** The fluid handling device of claim 20 comprising a capillary having an internal surface and an external surface, wherein at least a portion of at least one of the internal or external surfaces has the film disposed thereon.
22. **(Original)** The fluid handling device of claim 21 wherein at least a portion of the external surface of the capillary has the film disposed thereon.
23. **(Original)** The fluid handling device of claim 20 comprising a microfluidic article comprising a microfluidic handling architecture including a fluid handling surface wherein at least a portion of the fluid handling surface has the film disposed thereon.
24. **(Previously Presented)** A fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture including a fluid handling surface wherein at least a portion thereof has disposed thereon a film comprising diamond-like glass which comprises a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen.

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25. **(Previously Presented)** A fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture including a non-fluid handling surface wherein at least a portion thereof has disposed thereon a diamond-like film that is optically transmissive, hydrophilic, or both, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen.
26. **(Withdrawn)** A method of manufacturing a fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, the method comprising manufacturing a hydrophilic diamond-like film by a method comprising treating a diamond-like film in an oxygen-containing plasma, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen.
27. **(Previously Presented)** A fluid handling device comprising a substrate and an optically transmissive diamond-like film disposed on at least a portion of the substrate, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film exhibits substantially no fluorescence.

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28. **(Previously Presented)** A fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film exhibits substantially no fluorescence.
29. **(Previously Presented)** A fluid handling device comprising a substrate and an optically transmissive diamond-like film disposed on at least a portion of the substrate, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film is at least 50 percent transmissive to radiation at one or more wavelengths from about 180 to about 800 nanometers.
30. **(Previously Presented)** A fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film is at least 50 percent transmissive to radiation at one or more wavelengths from about 180 to about 800 nanometers.

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- 31 **(Withdrawn)** A method of manufacturing a fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, the method comprising manufacturing a hydrophilic diamond-like film by a method comprising treating a diamond-like film in an oxygen-containing plasma, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film exhibits substantially no fluorescence.
32. **(Withdrawn)** A method of manufacturing a fluid handling device comprising a microfluidic article comprising a microfluidic handling architecture comprising a fluid handling surface wherein at least a portion of the fluid handling surface includes a hydrophilic diamond-like film disposed thereon, the method comprising manufacturing a hydrophilic diamond-like film by a method comprising treating a diamond-like film in an oxygen-containing plasma, wherein the film comprises diamond-like glass comprising a dense random covalent system comprising on a hydrogen-free basis at least about 30 atomic percent carbon, at least about 25 atomic percent silicon, and less than or equal to about 45 atomic percent oxygen, and further wherein the film is at least 50 percent transmissive to radiation at one or more wavelengths from about 180 to about 800 nanometers.